Biomedical Engineers

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Nature of the Work

By combining biology and medicine with engineering, biomedical engineers develop devices and procedures that solve medical and health-related problems. Many do research, along with life scientists, chemists, and medical scientists, to develop and evaluate systems and products for use in the fields of biology and health, such as artificial organs, prostheses (artificial devices that replace missing body parts), instrumentation, medical information systems, and health management and care delivery systems. (See biological scientists, medical scientists, and chemists and materials scientists elsewhere in the *Handbook*.) Biomedical engineers design devices used in various medical procedures, such as the computers used to analyze blood or the laser systems used in corrective eye surgery. They develop artificial organs, imaging systems such as magnetic resonance, ultrasound, and x-ray, and devices for automating insulin injections or controlling body functions. Most engineers in this specialty require a sound background in one of the basic engineering specialties, such as mechanical or electronics engineering, in addition to specialized biomedical training. Some specialties within biomedical engineering include biomaterials, biomechanics, medical imaging, rehabilitation engineering, and orthopedic engineering.

Unlike many other engineering specialties, a graduate degree is recommended or required for many entry-level jobs.

Employment

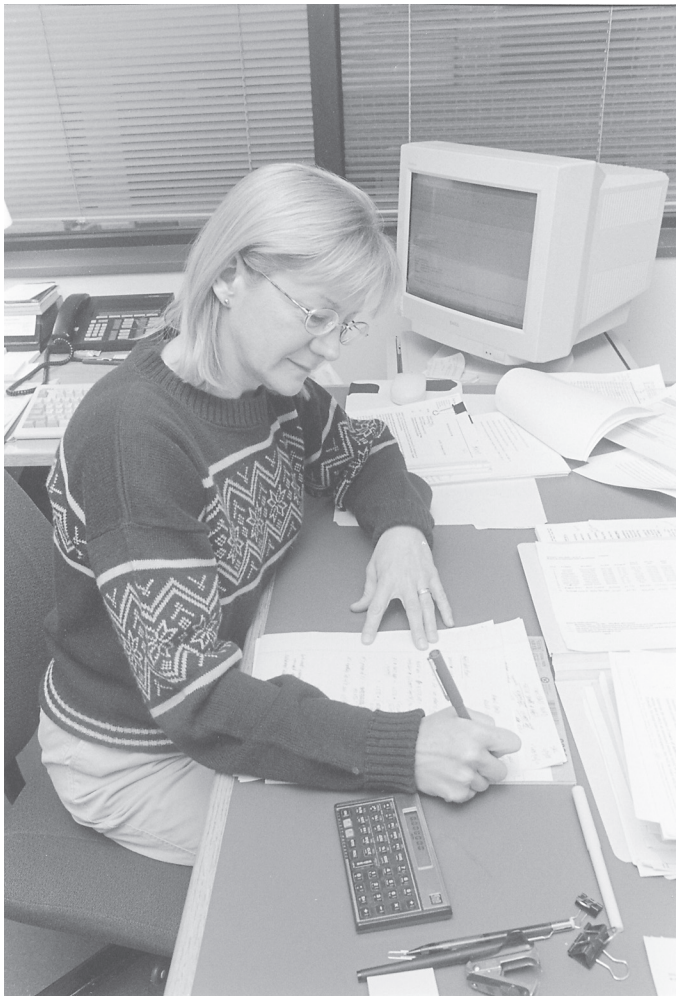
Biomedical engineers held about 7,600 jobs in 2002. Manufacturing industries employed 38 percent of all biomedical engineers, primarily in the pharmaceutical and medicine manufacturing and medical instruments and supplies industries. Many others worked for hospitals. Some also worked for government agencies or as independent consultants.

Job Outlook

Employment of biomedical engineers is expected to increase faster than the average for all occupations through 2012. The aging of the population and the focus on health issues will increase the demand for better medical devices and equipment designed by biomedical engineers. For example, computer-assisted surgery and molecular, cellular, and tissue engineering are being more heavily researched and are developing rapidly. In addition, the rehabilitation and orthopedic engineering specialties are growing quickly, increasing the need for biomedical engineers. Along with the demand for more sophisticated medical equipment and procedures is an increased concern for cost efficiency and effectiveness that also will boost demand for biomedical engineers. However, because of the growing interest in this field, the number of degrees granted in biomedical engineering has increased greatly, leading to the potential for competition for jobs.

Earnings

Median annual earnings of biomedical engineers were $60,410 in 2002. The middle 50 percent earned between $58,320 and $88,830. The lowest 10 percent earned less than $48,450, and the highest 10 percent earned more than $107,520.



Many biomedical engineers conduct research to develop and evaluate systems and products for use in the fields of biology and health.

According to a 2003 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in biomedical engineering received starting offers averaging $39,126 a year, and master's degree candidates, on average, were offered $61,000.

Sources of Additional Information

For further information about biomedical engineering careers, contact:

➤ Biomedical Engineering Society, 8401 Corporate Dr., Suite 225, Landover, MD 20785-2224. Internet: **http://www.bmes.org**

See the introduction to the section on engineers for information on working conditions, training requirements, and other sources of additional information.